NON-PUBLIC?: N
ACCESSION #: 9506140103
LICENSEE EVENT REPORT (LER)

FACILITY NAME: SURRY POWER STATION, Unit 2 PAGE: 1 OF 8

DOCKET NUMBER: 05000281

TITLE: Installation of Damaged Circuit Card Resulted in Unit 2
Manual Reactor Trip
EVENT DATE: 05/11/95 LER #: 95-004-00 REPORT DATE: 06/01/95

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: D. A. Christian, Station Manager TELEPHONE: (804) 357-3184

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: AA COMPONENT: MANUFACTURER: W120
X SJ SEAL C681

REPORTABLE NPRDS: Yes
No

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

Unit 2 was operating at 100% power on May 11, 1995 when the rod control system urgent failure annunciator alarmed in the control room at 1445 hours. While investigating the alarm condition, Instrumentation and Control personnel removed and inspected several circuit cards from rod control system power cabinet 2BD including failure detector circuit card J1. When circuit card J1 was reinstalled, the rod control system urgent failure alarm cleared. The rod control system urgent failure annunciator alarmed a second time at 1842 hours. While troubleshooting this condition, the four Control Bank B, Group 2 control rods dropped into the reactor core. In response, a manual reactor trip was initiated at 2231 hours. Appropriate operator actions were taken in accordance with emergency operating procedures to ensure the performance of system

automatic actions and to respond to abnormal conditions. The unit was quickly brought to a stable, no-load condition. A Root Cause Evaluation (RCE) Team investigation was initiated to determine the cause of this event and to recommend corrective actions. The RCE Team concluded that this event was caused by the installation of a damaged stationary gripper coil regulation circuit card. The results of the RCE Team investigation will be presented to management and recommendations that are designed to prevent the recurrence of this event will be implemented. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv).

END OF ABSTRACT

1.0 DESCRIPTION OF THE EVENT

Unit 2 was operating at 100% power on May 11, 1995 when the rod control system urgent failure annunciator EIIS-AA,ANN! alarmed in the control room at 1445 hours. To address this condition, Control Room Operators implemented Abnormal Procedure 0-AP-1.00, Rod Control System Malfunction, which placed the rod control system in the manual control mode.

Instrumentation and Control (I&C) Department personnel promptly investigated the condition and observed that the local urgent failure and Stationary Phase A failure indicator lights EIIS-AA,IL! in rod control system power cabinet 2BD were illuminated. Instrument Corrective Maintenance Procedure 0-ICM-RD-CAB-001, Rod Control System Power Cabinet and Logic Cabinet Troubleshooting, was initiated to determine the cause of the alarm and a Deviation Report was submitted.

While investigating the alarm condition, I&C personnel removed and inspected several circuit cards from rod control system power cabinet 2BD including the J1 Failure Detector circuit card. No problems or abnormal indications associated with the rod control system were identified except for the Stationary Phase A failure indicator light being illuminated. When circuit card J1 was reinstalled, the local urgent failure and Stationary Phase A failure indicator lights were extinguished. The rod control system urgent failure alarm was then manually reset by a Control Room Operator.

The affected portions of the rod control system were verified to be operable through the performance of Operations Periodic Test 2-OPT-RX-005, Control Rod Assembly Partial Movement, and the rod control system was returned to the automatic control mode at 1838

hours.

The rod control system urgent failure annunciator alarmed a second time at 1842 hours and 0-AP-1.00 was again implemented. I&C personnel continued to investigate the condition and decided to replace the Stationary Gripper Coil Phase A control circuit card, the Stationary Gripper Coil Regulation A circuit card, and the J1 Failure Detector circuit card.

1.0 DESCRIPTION OF THE EVENT (Continued)

Power to rod control system power cabinet EIIS-AA,CAB! 2BD was transferred to the DC Hold Cabinet and the subject circuit cards were replaced. When power was transferred back to the 2BD power cabinet, the four Control Bank B, Group 2 control rods (EIIS-AA,ROD! dropped into the reactor core. In response to this condition, a manual reactor trip was initiated at 2231 hours in accordance with 0-AP-1.00.

The reactor trip was followed by a turbine trip, main generator trip, and an actuation of the Anticipated Transient Without SCRAM Mitigation System Actuation Circuitry (AMSAC), as designed. Control Room Operators promptly initiated the appropriate emergency operating procedures.

The motor-driven and turbine-driven auxiliary feedwater pumps EIIS-BA,P! started on low-low steam generator water level and initially provided flow to the steam generators. The main steam dumps EIIS-SB,V! automatically opened to admit steam directly to the main condenser. The Reactor Coolant System average temperature stabilized at approximately 545 degrees F.

The plant response was as expected, except for the following notable discrepancies:

o The Reactor Coolant Pump (RCP) 2-RC-P-1C vapor seal head tank high level and seal leak-off low flow annunciators alarmed. Control Room Operators monitored RCP EIIS-AB,P! parameters in accordance with Abnormal Procedure 2-AP-9.00, RCP Abnormal Conditions. The alarms cleared without additional operator action.

o Steam Generator Power Operated Relief Valve (PORV) EIIS-SB,20! 2-MS-RV-201C opened momentarily during the initial transient.

A Control Room Operator placed the PORV in the manual control mode and closed the valve.

o Some leakage and smoke was observed emanating from the Main Feedwater Pump 2-FW-P-1B outboard mechanical seal EIIS-SJ,P,SEAL! during the post-trip transient. The pump was secured at 2241 hours.

o The illumination of the Individual Rod Position Indication (IRPI) rod bottom light EIIS-AA,ZI! for Control Rod M-10 was delayed.

1.0 DESCRIPTION OF THE EVENT (Continued)

The NRC was notified pursuant to 10 CFR 50.72(b)(2)(ii) on May 12, 1995 at 0204 hours. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv) as a manual actuation of the Reactor Protection System and an automatic actuation of the Auxiliary Feedwater System.

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

This event resulted in no safety consequences or implications. Appropriate operator actions were taken in accordance with emergency operating procedures to ensure the performance of system automatic actions and to respond to abnormal conditions. The unit was quickly brought to a stable, no-load condition. Therefore, the health and safety of the public were not affected at any time during this event.

3.0 CAUSE OF THE EVENT

A multi-discipline Root Cause Evaluation (RCE) Team investigation was initiated on May 12, 1995 to determine the cause of this event and to recommend corrective actions. The RCE Team concluded that this event was caused by the installation of a damaged stationary gripper coil regulation circuit card, which resulted in four control rods being dropped into the reactor core.

The stationary gripper coil regulation circuit card was carefully inspected following the reactor trip. The inspection revealed that Resistor R18 had a hairline crack and Resistor R19 was bent out of its proper position. Resistor R18 is a part of the auctioneering differential amplifier circuitry, which compares a reference signal to the highest stationary gripper coil current feedback signal.

With R18 broken, the auctioneering differential amplifier sensed a high current on the first control rod of the group. As a result, the auctioneering differential amplifier output decreased to near zero to lower the stationary gripper coil current to the proper level. When power was transferred from the DC Hold Cabinet to the rod control system power cabinet 2BD, the lack of current to the stationary gripper coils allowed the four Control Bank B, Group 2 control rods to drop into the reactor core.

3.0 CAUSE OF THE EVENT (Continued)

Figure "STATIONARY GRIPPER COIL REGULATION CIRCUIT CARD" omitted.

The spatial relationship of Resistors R18 and R19 on the stationary gripper coil regulation circuit card and the type of damage incurred by each resistor suggests that the circuit card may have been impacted by another object at some time prior to installation. This damage was not readily apparent and was not recognized by the I&C personnel who installed the card. The RCE Team could not conclusively determine how or when the subject circuit card was damaged.

3.0 CAUSE OF THE EVENT (Continued)

The RCE Team also inspected the original stationary gripper coil regulation circuit card and identified a loose solder connection on a transistor. The RCE Team determined that the loose connection caused the rod control system urgent failure annunciator alarms.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

A manual reactor trip was initiated immediately after the four Control Bank B, Group 2 control rods dropped into the reactor core.

Following the reactor trip, Control Room Operators acted promptly to place the unit in a safe, shutdown condition in accordance with emergency and other operating procedures.

The Shift Technical Advisor monitored the critical safety function status trees to ensure that plant parameters remained acceptable.

5.0 ADDITIONAL CORRECTIVE ACTION(S)

The damaged Stationary Gripper Coil Regulation A circuit card was replaced.

An engineering evaluation of the RCP 2-RC-P-1C response following the reactor trip was performed. The response data indicates that the No. 2 seal opened temporarily and subsequently resealed. The evaluation noted that the RCP seal is capable of opening on a high differential pressure condition and concluded that no seal problems exist since the No. 2 seal closed spontaneously, and the No. 1 and No. 2 seal leak-off flow returned to normal.

The PORV 2-MS-RV-201C controller was checked and found to be acceptable. An engineering evaluation, which had been previously initiated, is assessing PORV performance issues.

5.0 ADDITIONAL CORRECTIVE ACTION(S) (Continued)

The Main Feedwater Pump 2-FW-P-1B outboard mechanical seal was inspected, found broken, and replaced. Maintenance Engineering is investigating to determine the cause of the seal failure.

A hot rod drop test was conducted which verified that Control Rod M-10 is fully operable. The IRPI rod bottom light for Control Rod M-10 has exhibited a slow response following reactor trips for several years. Engineering and vendor personnel have evaluated this condition and several actions have been implemented to correct it. These actions include the performance of Time Domain Reflectometry testing, resistance and inductance testing, and the replacement of the M-10 IRPI coil stack and signal conditioning module. Additional testing and maintenance actions are being evaluated.

6.0 ACTIONS TO PREVENT RECURRENCE

The RCE Team is continuing to investigate this event. The results of this investigation will be presented to management and recommendations that are designed to prevent the recurrence of this event will be implemented.

7.0 SIMILAR EVENTS

A Unit 1 manual reactor trip was initiated on January 2, 1992 when more than one control rod dropped into the reactor core. Control Rod E-5 dropped into the core during the performance of the monthly

control rod freedom of movement testing. While manually adjusting control rods to control delta flux variations resulting from the dropped rod E-5, Control Rod H-2 dropped into the reactor core. This event occurred due to a personnel error in the preparation of the troubleshooting guide for Control Rod E-5. Licensee Event Report 50-280/92-001-00 reported this event.

8.0 MANUFACTURER/MODEL NUMBER

Westinghouse Electric Corporation
Stationary Gripper Coil Regulation Circuit Cards
Model Numbers: 6050D16G01, Rev. 2
1048F56G03, Rev. 0

John C. Crane Packing Company
5 1/8 Inch Diameter Shaft Seal for Main Feedwater Pump 2-FW-P-1B
Model Number: Type 8B1

9.0 ADDITIONAL INFORMATION

Unit 1 was operating at 100% power and was not affected by this event.

On May 21, 1995, a Unit 2 manual reactor trip was initiated immediately after the four Control Bank A, Group 2 control rods dropped into the reactor core. The RCE Team, established to investigate the May 11, 1995 reactor trip, is also investigating this event with a focus on the identification of any similar causes or generic implications. The May 21, 1995 event will be reported by Licensee Event Report 50-281/95-005-00.

10CFR50.73

Virginia Electric and Power Company
Surry Power Station
P. O. Box 315
Surry, Virginia 23883

June 1, 1995

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License No.: DPR-37

Dear Sirs:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Unit 2.

REPORT NUMBER

50-281/95-004-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

D. A. Christian
Station Manager

Enclosure

pc: Regional Administrator
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M. W. Branch
NRC Senior Resident Inspector
Surry Power Station

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